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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/763,269	01/26/2004	Shigchisa Tanaka	ASAM.0098	6471
7590	09/30/2005		EXAMINER LOUIE, WAI SING	
Stanley P. Fisher Reed Smith LLP Suite 1400 3110 Fairview Park Drive Falls Church, VA 22042-4503			ART UNIT 2814	
			PAPER NUMBER	

DATE MAILED: 09/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/763,269	Applicant(s) TANAKA ET AL.	
	Examiner Wai-Sing Louie	Art Unit 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 21 July 2005.  
 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.  
 4a) Of the above claim(s) 8-12 is/are withdrawn from consideration.  
 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
 6) ☒ Claim(s) 1-7 is/are rejected.  
 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.  
 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) ☒ All b) ☐ Some \* c) ☐ None of:  
 1. ☒ Certified copies of the priority documents have been received.  
 2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3 and 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pauchard et al. (US 6,384,462) in view of Rodgers et al. (US 5,233,209).

With regard to claims 1-2 and 6-7, Pauchard et al. disclose an avalanche photodetector, APD, (col. 4, line 29 to col. 7, line 15 and fig. 4) comprising:

- An absorption layer 11 absorbing light to create carriers (col. 4, lines 35-36 and fig. 4);
- A multiplication layer 14 multiplying the created carriers (col. 5, lines 23-25 and fig. 4), where the multiplication layer 14 is formed of Si (col. 4, line 64) and the absorption layer 11 is formed of a compound semiconductor (col. 4, line 36), and
- Pauchard et al. do not disclose an interface layer between the multiplication layer 14 and the absorption layer 11. However, Rodgers et al. disclose a grading layer 4 between the multiplication layer 5 and absorption layer 3 being in direct contact with the multiplication layer 4 (Rodger col. 2, lines 16-18 and fig. 1). Rodgers et al. teach the grading layer is provided to avoid tunneling of dark currents (Rodgers col. 1, lines 17-40). Therefore, it would have been obvious for the one

with ordinary skill in the art to modify Pauchard's device with the teaching of Rodgers et al. to provide an interface layer between the multiplication layer and the absorption layer in order to avoid tunneling of dark currents. The bandgap of the InGaAsP interface layer in Rodgers et al. is larger than the bandgap of the InGaAs absorption layer (have phosphorus in the semiconductor compound).

With regard to claim 3, Pauchard et al. modified by Rodgers et al. disclose the interface layer is made of InGaAsP material (Rodgers fig. 1).

With regard to claim 5, Pauchard et al. disclose the absorption layer 11 is fused to the multiplication layer 14 (col. 4, lines 41-43). Therefore, Pauchard et al. modified by Rodgers et al. in claim 1 above, would have an interface layer, where the junction between the multiplication layer 14 and the interface layer is fused together.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pauchard et al. (US 6,384,462) modified by Rodgers et al. (US 5,233,209) as applied to claim 1 above, and further in view of Razeghi et al. (US 5,650,635).

With regard to claim 4, Pauchard et al. modified by Rodgers et al. do not disclose the absorption layer is formed of a semiconductor containing Sb. However, Razeghi et al. disclose InGaSb (Razeghi col. 5, line 42 to col. 6, line 4, Example 3, and fig. 2). Razeghi et al. teach the Sb-based semiconductor heterostructure for used in photodetector could reduce dark current and increase resistance for use at room temperature (Razeghi col. 1, lines 9-13). Pauchard et al. and Razeghi et al. have substantially the same environment of photodetector having mixed

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semiconductor crystal absorption layer. Therefore, it would have been obvious at the time the invention was made to modify Pauchard's device with the teaching of Rodgers and Razeghi et al. to provide Sb-based compound for the absorption layer in order to reduce dark current and increase resistance of the device.

### *Response to Arguments*

Applicant's arguments with respect to claims 1-7 have been considered but are moot in view of the new ground(s) of rejection in view of the newly cited reference.

### *Conclusion*

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

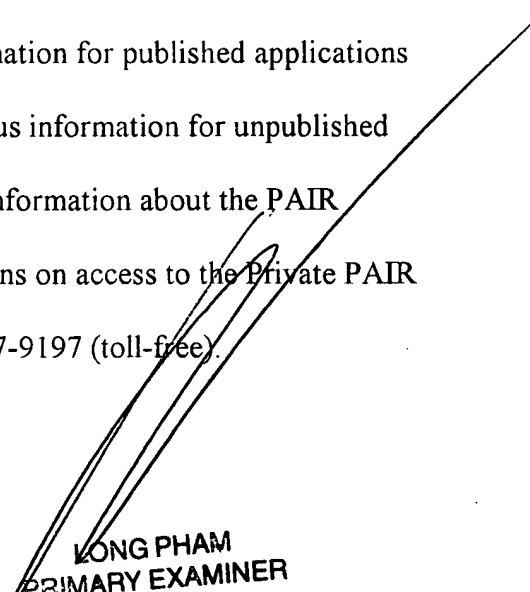
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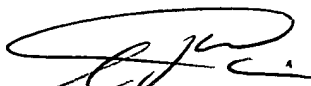
however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wai-Sing Louie whose telephone number is (571) 272-1709. The examiner can normally be reached on 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
LONG PHAM  
PRIMARY EXAMINER

  
Wsl  
February 15, 2005.